

SUBMARINE MANUFACTURING & PRODUCTS LTD

Worldwide Suppliers of Diving, Hyperbaric and Subsea Equipment

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TECHNICAL SPECIFICATION DOCUMENT FOR

Temporary Containerised 22 Man Recompression Facility

By

Submarine Manufacturing and Products Limited



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SPECIFICATION

1.0. 40' ISO Type Container

This custom build container will be designed and built to house this TUP system. This container will be outfitted with the following:-

- 2 x personnel doors will be fitted with waterproof type seals.
- 4 x penetration plates will be fitted, these will be a removable type which will be fitted from the side of the container and fitted with water proof bulk heads. These will be used for the inward gas services, outward gas services and electrical cabling.
- 1 x large penetrator plate will be fitted for the TUP side manway to protrude through; this will be fitted with water resistant seals for both the sealing plate and side manway.
- The container will be fitted with a steel chequer plate floor, lifting padeyes to the roof and twist lock corner casting to the base.
- The container will be fully insulated to the side walls, roof and doors. This will maintain a suitable temperature inside the container together with the air conditioning system.
- The container will be painted to a standard marine grade specification.
- Container colour outside white and internal white.
- Container dimensions and weight: 40' L x 11.8' W x 11.8' H and 25 tonnes (approx weight). This will depend on the final specification.
-

2.0. Electrical System

This system will be a marine grade electrical system. Based on an incoming supply of 440V 3 phase 60 HZs. The electrical supply will be supplied to the container via weather tight electrical gland mounted in the penetrator plate. The electrical system will include:

- Switch board and circuit breaker 440 VAC 3P / 240 VAC 1P / 12 VDC
- 4 x fluorescent strip lights
- 4 x emergency battery powered lights
- 6 x 13 amp 240 V double clad metal power sockets (UK type)
- Earth leakage trip system
- Stand-by 12 VDC supply in the event of mains failure (battery pack).

3.0. DTL Chamber (Diver Transfer Lock)

This is a reconditioned 2.22 mtr diameter x 2.53 mtr H Diver Transfer Under Pressure and Living Chamber refitted to meet with this enclosed specification. The DTL is a vertical transfer chamber with 2 x 600 mm / 24" manways and 12" medical lock, 3 x viewports in the shell of the chamber and 3 x viewport in the top dished head of the chamber. The outfitting and layout of the chamber is as follows:-

- **Internal Environment Control System**

The ECU will be mounted under the seating in the DTL. This unit comprises of a stainless steel enclosure with heat exchanger and 12 VDC motor driven fans, which will be controlled from the main control station. The system will work on chilled fluid from the main chilled package pressing through the ECU via interconnecting pipework at the pressure hull.

- **Manways**

These will be 2 x 600 mm DIA / 24" DIA manways in the shell of the DTL positioned at 90° to each other. Both manways will have bolted flanges, one flange will be for interconnecting to the Deck Decompression Chamber (DDC) and the other flange will be for connection to the NATO adaptor flange on the outside of the container. A transition adaptor ring will be fitted to fit the NATO closure ring to the DTL external manway.

- **Medical Lock**

One medical lock of 400mm internal diameter by 560mm internal length will be located in the chamber shell and will be supplied complete with all necessary valves and gauges, internal and external door, external door clamps and pressure activated safety interlock. The medical lock will be pressurised and vented from outside the chamber.

- **Toilet**

A hyperbaric toilet will be positioned in the DTL, the toilet will be connected to a small internal holding tank which will be controlled by interlocking safety valves on both the inlet and outlet, the pipework for the system will be piped through this pressure hull and interconnected to the sewage, bilge and deluge tank drains, to the outside of the container.

- **Shower and Sink**

A shower head and hose will be installed in this DTL. This will be positioned by a small stainless steel sink on the wall of DTC. A simple control and regulating panel will be situated close by for the operating of this equipment. The drains will be interconnected by spring return valves for safe operation, this will be piped through the pressure hull and interconnected to the sewage, bilge and deluge tank drain to the outside of this container.

- **BIBS System**

The BIBS system will have an internal control panel to provide treatment gases, air, oxygen, helium/oxygen or nitrox to the 5 BIBS the selection of this gas will be connected from the master control panel. The control of the BIBS will incorporate all independent isolation valves, non-return valves, first stage regulators, quick connects and back pressure regulators. All services to and from the BIBS will be piped via the master control panel.

- **O₂ Make Up**

Any oxygen make up system will be installed. It will be situated close to the CO₂ scrubber so that the air flow from the scrubber can distribute the oxygen around the DTL to avoid any high concentration of oxygen. This injection control will be from the master control panel.

- **Seats**

The seating arrangement will consist to 3 (three) fold up aluminium type seats with fire retardant covers.

- **Flanged NATO Ring**

The external flanges of the DTL will be fitted with a short tapered transition adapter flange to fit the client's original NATO closure ring to the flange. Detail of the NATO flange needs to be provided to SMP in order to have the matching bolt pattern and faces made up.

- **CO₂ Scrubbers**

In the DTL there will be 2 x electrically driven CO₂ scrubber. The scrubber will have a gas flow of approximately 400 litres per minute. The scrubber will have a removal canister that holds approximately 6 KGs of absorbent.

- **Temp and Humidity**

A dual temperature and humidity gauge will be in the DTL with a range of -20°C to 100°C and 0° to 210°F.

- **Gas Analysis**

Two valved penetrators will be allocated to allow sample gas from the top and bottom of the chamber and to be analysed on the main control station.

- **Deck Plates**

Deck Plates in the DTL are all aluminium chequered plate. These can be easily removed by the chambers occupants for cleaning and maintenance.

- **Viewports**

The DTL will be fitted with 6 unrestricted view ports, 3 x in the side wall of the chamber and 3 x in the top of the chamber.

- **CCTV**

An external colour TV camera will be fitted to the outside of a viewport allowing visibility of the compartment interior. The master control unit for this will be situated at the main control station.

- **DTL Internal Lighting**

Two internal hyperbaric lights will be fitted in the DTL. These lights will be individually switched at the master control station.

- **Communication System**

A two channel talk back speaker complete with headset will be provided in the entry lock. Emergency communications will be provided by a sound powered phone located on the pressure hull.

- **Depth monitoring**

One internal Caisson gauge will be fitted in the DTL. This will be positioned for clear visual contact. The accuracy of the gauge will be .25% over a range of 0-230' FSW / 70 MSW.

In addition normal pressure sensing line will be fitted between the DTL and this main control station for depth monitoring.

- **Fire Suppression System**

The DTL is equipped with a water deluge fire suppression system. Deluge nozzles are fitted to the chamber roof. The nozzles are positioned at specific points to cover all interior surfaces. The activation of the system is by internal operation or at the master control panel.

In addition there will be a 7 ltr hand held hyperbaric fire extinguisher fitted with suitable brackets.

- **Pressurisation**

Main Lock - 1.00 bar in 2 minutes
Entry Lock - 1.00 bar in 2 minutes

- **Depressurisation**

All locks - 1.00 bar in 2 minutes

Silencers will be fitted to minimise noise levels at maximum pressurisation rate. All hull penetrations will be clearly labelled both inside and outside.

Each chamber door will be sealed using an 'O'-Ring trapped in a dove tailed groove.

- **Valve and Fittings**

All valves used will be Brass/Stainless Steel construction fitted either side of the pressure hull pipework penetrations. HP air, O₂ and Nitrox circuits will be fitted with rising stem needle valves whilst LP air and other gas/fluid service valves will be ¼ turn ball valves.

- **Safety Valves**

An overpressure relief valve will be fitted in this lock to ensure no over pressurisation can occur during the use of both primary and secondary supplies.

- **Electrical Penetrators**

All electrical services to the inside of the chamber will be through hyperbaric type multi way penetrators with junction boxes, terminal block and electrical glands.

4.0. Deck Decompression Chamber (DDC)

This is a reconditioned 1.8 mtr DIAMETER x 6.0 mtr long twin lock DDC reconfigured to meet with the enclosed specification. The DDC is a horizontal twin compartment chamber with 3 x 600 mm / 24" manways situated along the centre line at the chamber; the manways are positioned one at each end of the DDC and one centre manway fitted with back to back doors.

There are 2 viewports fitted in Lock 1 and 4 viewports fitted in Lock 2. A 430 mm long x 300 mm DIA medical lock is fitted to Lock 2 of the chamber.

The outfit and layout of the chamber is as follows. Lock 1 and Lock 2 as the main lock.

LOCK 1 (Entry Lock)

- **Internal Environment Control System**

The ECS will be mounted under the bunks in the Lock 1. This unit comprises of a stainless steel enclosure with heat exchanger and 12 VDC motor driven fans, which will be controlled from the main control station. The system will work on chilled fluid from the main chilled package pressing through the ECS via interconnecting pipework at the pressure hull.

- **BIBS System**

The BIBS system will have an internal control panel to provide treatment gases, air, oxygen, helium/oxygen or nitrox to the 10 BIBS the selection of this gas will be connected from the master control panel. The control of the BIBS will incorporate all independent isolation valves, non-return valves, first stage regulators, quick connects and back pressure regulators. All services to and from the BIBS will be piped via the external control panel.

- **Manways**

There will be 2 x manways in this chamber, 1 x will be connected to the DTL and 1 x manway will be connected to Lock 2 chamber. Note the manways between Lock 1 and 2 will be fitted with back to back doors.

- **O₂ Make Up**

Any oxygen make up system will be installed. It will be situated close to the CO₂ scrubber so that the air flow from the scrubber can distribute the oxygen around the chamber to avoid any high concentration of oxygen. This injection control will be from the master control panel.

- **Seats**

The seating arrangement will consist to 2 (two) fold up aluminium type bench seats with fire retardant covers.

- **CO₂ Scrubbers**

In the chamber there will be 4 x electrically driven CO₂ scrubber. The scrubber will have a gas flow of approximately 400 litres per minute. The scrubber will have a removal canister that holds approximately 6 KGs of absorbent.

- **Temp and Humidity**

A dual temperature and humidity change will be in the DTL with a range of -20°C to 100°C and 0° to 210°F.

- **Gas Analysis**

Two valved penetrators will be allocated to allow sample gas from the top and bottom of the chamber to be analysed on the main control station analysis panel.

- **Deck Plates**

Deck Plates in the chamber are all aluminium chequered plate. These will be easily removed by the chambers occupants for cleaning and maintenance.

- **Viewports**

The chamber will be fitted with 2 unrestricted view ports. One viewport has a DIA of 180 mm viewing area and one viewport of 90 mm viewing area.

- **CCTV**

An external colour TV camera will be fitted to the outside of a viewport allowing visibility of the compartment interior. The master control unit for this will be situated at the main control station.

- **Internal Lighting**

4 (four) internal hyperbaric lights will be fitted in the chamber. These lights will be individually switched at the master control station.

- **Communication System**

A two channel talk back speaker complete with headset will be provided in the this lock. Emergency communications will be provided by a sound powered phone located on the pressure hull.

Also a single entertainment speaker with ON/OFF and volume control will be fitted and music supplied from the main control station.

- **Depth monitoring**

One internal Caisson gauge will be fitted in the chamber. This will be positioned for clear visual contact. The accuracy of the gauge will be .25% over a range of 0-230' FSW / 70 MSW.

In addition normal pressure sensing line will be fitted between the chamber and this main control station for depth monitoring.

- **Fire Suppression System**

The chamber is equipped with a water deluge fire suppression system. Deluge nozzles are fitted to the chamber roof. The nozzles are positioned at specific points to cover all interior surfaces. The activation of the system is by internal operation or at the master control panel.

In addition there will be a 7 ltr hand held hyperbaric fire extinguisher fitted with suitable bracket for storage.

- **Pressurisation**

Main Lock - 1.00 bar in 2 minutes
Entry Lock - 1.00 bar in 2 minutes

- **Depressurisation**

All locks - 1.00 bar in 2 minutes

Silencers will be fitted to minimise noise levels at maximum pressurisation rate. All hull penetrations will be clearly labelled both inside and outside.

Each chamber door will be sealed using an 'O'-Ring trapped in a dove tailed groove

- **Valve and Fittings**

All valves used will be Brass/Stainless Steel construction fitted either side of the pressure hull pipework penetrations. HP air, O₂ and Nitrox circuits will be fitted with rising stem needle valves whilst LP air and other gas/fluid service valves will be ¼ turn ball valves.

- **Safety Valves**

An overpressure relief valve will be fitted in this lock to ensure no over pressurisation can occur during the use of both primary and secondary supplies.

- **Electrical Penetrators**

All electrical services to the inside of the chamber will be through hyperbaric type multi way penetrators with junction boxes, terminal block and electrical glands.

LOCK 2

- **Internal Environment Control System**

The ECS will be mounted under the seating in the Lock 2. This unit comprises of a stainless steel enclosure with heat exchanger and 12 VDC motor driven fans, which will be controlled from the main control station. The system will work on chilled fluid from the main chilled package pressing through the ECS via interconnecting pipework at the pressure hull.

- **Manways**

There will be 2 x 600 mm DIA / 24" DIA manways in this chamber. One manway will be for interconnecting to Lock 1 internally; the other manway will be located at the end of the chamber which exits to the outside of the chamber.

This manway will be flanged on the outside and could be fitted with a transition adaptor flange to enable the use of this NATO closure ring (see below flanged NATO ring).

- **Medical Lock**

One medical lock of 300 mm internal diameter x 430 mm internal length will be located in the chamber wall and will be supplied complete with all necessary valves and gauges, internal and external door, external door clamps and safety interlock. The medical lock will be pressurised and vented from outside the chamber.

- **BIBS System**

The BIBS system will have an internal control panel to provide treatment gases, air, oxygen, helium/oxygen or nitrox to the 12 BIBS the selection of this gas will be connected from the master control panel. The control of the BIBS will incorporate all independent isolation valves, non-return valves, first stage regulators, quick connects and back pressure regulators. All services to and from the BIBS will be piped via the external control panel.

- **O₂ Make Up**

Any oxygen make up system will be installed. It will be situated close to the CO₂ scrubber so that the air flow from the scrubber can distribute the oxygen around the chamber to avoid any high concentration of oxygen. This injection control will be from the master control panel.

- **Bunks**

The seating arrangement will consist to 2 (two) fold up aluminium type seats with fire retardant covers.

- **Flanged NATO Ring**

The external flanges of the chamber will be fitted with a short tapered flange to fit the client's original NATO closure ring to the flanges. Detail of this NATO need to be provided to SMP in order to have the matching bolt pattern and faces made up.

- **CO₂ Scrubbers**

In the chamber there will be 4 x electrically driven CO₂ scrubber. The scrubber will have a gas flow of approximately 400 litres per minute. The scrubber will have a removal canister that holds approximately 6 KGs of absorbent.

- **Temp and Humidity**

A dual temperature and humidity change will be in this chamber with a range of -20°C to 100°C and 0° to 210°F.

- **Gas Analysis**

Two valved penetrators will be allocated to allow sample gas from the top and bottom of the chamber to be analysed on the main control station.

- **Deck Plates**

Deck Plates in the chamber are all aluminium chequered plate. These will be easily removed by the chambers occupants for cleaning and maintenance.

- **Viewports**

The chamber will be fitted with 4 unrestricted view ports. Two viewports have a DIA of 180 mm viewing area and two viewports of 90 mm viewing area.

- **CCTV**

An external colour TV camera will be fitted to the outside of a viewport to show visibility of the compartment interior. The master control unit for this will be situated at the main control station.

- **Lock 2 Internal Lighting**

4 (four) internal hyperbaric lights will be fitted in this lock. These lights will be individually switched at the master control station.

- **Communication System**

A two channel talk back speaker complete with headset will be provided in the this lock. Emergency communications will be provided by a sound powered phone located on the pressure hull.

Also a single entertainment speaker with ON/OFF and volume control will be fitted and music supplied from the main control station.

- **Depth monitoring**

One internal Caisson gauge will be fitted in the chamber. This will be positioned for clear visual contact. The accuracy of the gauge will be .25% over a range of 0-230' FSW / 70 MSW.

In addition normal pressure sensing line will be fitted between the DTC and this main control station for depth monitoring.

- **Fire Suppression System**

The DTL is equipped with a water deluge fire suppression system. Deluge nozzles are fitted to the chamber roof. The nozzles are positioned at specific points to cover all interior surfaces. The activation of the system is by internal operation or at the master control panel.

In addition there will be a 7 ltr hyperbaric fire extinguisher fitted with suitable bracket arrangement for storage.

- **Pressurisation**

Main Lock - 1.00 bar in 2 minutes
Entry Lock - 1.00 bar in 2 minutes

- **Depressurisation**

All locks - 1.00 bar in 2 minutes

Silencers will be fitted to minimise noise levels at maximum pressurisation rate. All hull penetrations will be clearly labelled both inside and outside.

Each chamber door will be sealed using an 'O'-Ring trapped in a dove tailed groove.

- **Valve and Fittings**

All valves used will be Brass/Stainless Steel construction fitted either side of the pressure hull pipework penetrations. HP air, O₂ and Nitrox circuits will be fitted with rising stem needle valves whilst LP air and other gas/fluid service valves will be ¼ turn ball valves.

- **Safety Valves**

An overpressure relief valve will be fitted in this lock to ensure no over pressurisation can occur during the use of both primary and secondary supplies.

- **Electrical Penetrators**

All electrical services to the inside of the chamber will be through hyperbaric type multi way penetrators with junction boxes, terminal block and electrical glands.

5.0. Master Control Panel

A control panel will be mounted on the side of the Deck Decompression Chamber to enable easy operation of all three chambers from a central position.

Each lock will have its own dedicated control panel with a common communicating analysis, gas supply entertainment, depth monitors and electrical supply panel.

The panel will have all controls and instrumentation necessary for the safe working of the chamber.

- **Lock 1 and 2 Panel**

The main lock will have its own control section containing all valves located on a vertical plane with clearly defined and labeled mimic lines, O₂, Standby O₂, Heliox or Nitrox, Standby and Main Air will be delivered to the panel at 40 bar and 10 bar.

Incoming treatment gases will be monitored for pressure with each gas feeding common manifold having an intermediate block and vent facility to prevent cross contamination of gases.

An analysis line will be provided off of the final mask delivery line for supply to the analysis panel.

A chamber pressurisation valve will be provided.

Two valves providing fast and slow decompressurisation will be fitted. The slow valve will be fitted with a downstream flowmeter for fine decompression control.

Individual clocks recording real and elapsed time will be incorporated. A digital pressure gauge reading 0-70 MSW with 0.25% accuracy and decimal point display will be fitted together with a 0-70mtr/230 FSW 0.25% accuracy gauge. The gauge will be safety pattern, zero adjustment, oxygen cleaned with mirror scale. In addition to this there will be a 0-20 FSW / 70 MSW 0.25% accuracy gauge, oxygen cleaned with mirror scale for therapeutic use.

- **DTL Panel**

The DTL Lock Panel will have its own control section containing all valves located on a vertical plane with clearly defined and labeled mimic lines. O₂, Standby O₂, Heliox or Nitrox, Standby and Main Air will be delivered to the panel at 40 bar and 10 bar.

Incoming treatment gases will be monitored for pressure with each gas feeding a common manifold and having an intermediate block and vent facility to prevent contamination of gases.

A chamber pressurization valve will be provided.

Two valves providing fast and slow decompressurisation will be fitted. The slow valve will be fitted with a downstream flowmeter for fine decompression control.

A digital pressure gauge reading 0-70 MSW with 0-25% accuracy and decimal point display.

A 0-70mtr/230 FSW 0.25% accuracy gauge. The gauge will be safety pattern, zero adjustment, oxygen cleaned with mirror scale.

- **Analysis Panel**

A common analysis rack will be located between the three control panels.

The analysis rack will consist of an oxygen analyzer, carbon dioxide analyzer and a selector panel for sampling points in both locks including: -

- High and Low Alarms
- High and Low Chamber Points
- Chamber BIBS Supply in pairs only
- Analyzer Zero and Calibration Gases to be supplied by others

Once selected the gas, this will be pressure reduced passed through to the analyzers.

- **Gas Supply Panel**

The gas supply panel will consist of selection valves for either HP Main or Standby Air and valved LP Gauges for each air supply, main and standby O₂ and Heliox/Nitrox mixtures.

A normal reading on one of these gauges will indicate that the particular gas is available to the chamber control console. A reading on the individual control panel final supply gauge will indicate that the gas is on line.

- **Communications Panel**

A common communications point will be located between the three control panels.

The communications equipment will be panel mounted in the vertical panel and will incorporate all necessary controls.

The panel will have facilities to allow communications with each lock individually or simultaneously. Each channel will include facilities for on/off, volume control and an audio/call system.

The panel will incorporate loudspeaker and microphone and alternative headset facilities for 4 wire, hands free telephonic communication.

A sound powered phone for emergency back up will be fitted to each lock.

- **Entertainment System, Depth Monitor & Recording Main Lock Panel**

The chamber system will be fitted with entertainment speakers in Lock 1 and 2, which will allow the input from a CD player or an alternative source i.e. radio or tape at this location.

A pressure/depth transducer will be fitted to the DTL, Lock 1 and Lock 2 depth sensing lines which will be linked to digital readouts. There will also be a facility from this to plug in a PC to record the dive profile (SMP will not be providing the PC or software to monitor the dive profile). This needs to be specified in terms of the software spec i.e. Patient records, dive profile, decomp tables etc

The above equipment, both the entertainment system and the depth monitoring system will be situated in a separate section of the main control station.

- **TV System**

This will consist of 3 x rack mounted colour monitors with topside controller for all monitors and cameras. Separately rack mounted will be a VCR recorder to record the TV camera operations as required.

- Two cameras will be situated externally above the end of manways of both Lock 1 and Lock 2 of the viewports.
- One camera will be mounted on a swivel external on the viewport of the DTL.

The above system will be mounted in a separate section of the master control station console.

- **Air/Gas Supplies to the DDC**

- The 40 bar air supply from the penetrator plate to the master control panel of the chamber will consist of 1" Tungham Tubing routed and fixed in position with the appropriate fixings at individual points along the pipework. This pipe work will consist of one separate 1" diameter high pressure pipeline. The pipeline will terminate at the main control panel of the chamber.
- The high pressure oxygen/gas supplies will be routed from the penetrator plate inside the container using a primary and secondary ½" line. This will be reduced at source and supplied to the panel at low pressure. The pressure display point at the panel will have a digital gauge to indicate the HP supply on line at the panel.

- **Electrical Control Panel**

This control panel will be situated to one side of the master control panel and will incorporate all the power and control switches for internal lighting, scrubbers, connections, analysers, environment control system and CCTV system.

- **Calibration**

All gauges and analyzer will be fitted with individual calibration points for easy maintenance and calibration.

6.0. LP Air System

The LP air pressurisation system will consist of 3 x 500 ltr 14 bar vertical welded air receivers. These will be mounted in to the end of the 40' container. Each receiver will be interconnected to each lock via the control panel. These will act as buffer tanks to avoid loss of pressure during rapid pressurisation. The connection to these receivers will be from the LP supply at the penetrator plate.

7.0. Fire Suppression System

3 x pressurised water storage tanks are provided – one for each lock. The tanks will be horizontally mounted above and behind Lock 1 and 2 of the DDC. These will be pressurised with compressed air, electrically operated 24 VDC solenoid valves will be mounted on a water supply manifold close to each chamber lock. This will be interconnected to the nozzles spray head in each chamber. Activation of this system is by a simple push button in each chamber lock which will also alert the chamber operator on the outside of the chamber.

A manual override and activation panel will be positioned at the master control panel with warning activators both audio and visual. This will also have deluge water tank pressure gauges fitted.

In addition a water sprinkler system supply system will be installed in to the roof of this container directly above the DTL, Lock 1 and Lock 2.

8.0. Pipework

All pipe work and fittings within the container and on the equipment will be to H.S.E. and A.D.C. specifications. All pipework will be of Tungham, most of the pipe connections will be Parker Triplok brass with the exception of BetaBite fittings on various HP connections were necessary.

9.0. Work Bench

This is a Industrial Heavy Duty Workbench, constructed from 3mm high grade steel, welded apron around the back and the sides, with a sturdy lower shelf for the heavy storage of items, the Bench will be fitted with 2 set of 3 lockable draws each side of the work bench.

10.0. Storage Racks

A Storage Rack with wire meshing to the sides and front area will be situated in the roof of the container for safe storage of small items.

11.0. Certification

1. Lloyds Register of Shipping Certificate will be supplied for the chamber Hydrostatic and Air Test.
2. Hydraulic Test Certificates for all pipe work relative to the project.
3. Gauge Test Certificates for all gauges on the installation.
4. New PVHO for all DDC viewports.
5. Certificates and Test for all relief valves on the installation.
6. Certificates for all lifting lugs on container.
7. Certificates of Conformity for all regulators used within the system.
8. Certificates of electrical circuitry and equipment.
9. Certificates of Conformity for Oxygen Analyser and Test.